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COUNCIL OF NATIONAL DEFENSE

NATIONAL RESEARCH COUNCIL

Basis of Organization
and Means of Co-operation
with State Councils
of Defense

WASHINGTON, *May 1, 1917*

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Council of National Defense

National Research Council

Basis of Organization and Means of Co-operation with State Councils of Defense

One of the most striking results of the war is its demonstration of the importance of scientific research in strengthening the national defense. Soon after the opening of hostilities, England and France were faced with industrial and military demands soluble only in their research laboratories. Looking ahead, it was seen that the conclusion of peace would be followed by a trade war with Germany, in which no industry not perfected by scientific research could be expected to survive. As a consequence there arose through governmental action in England, France, Australia, New Zealand and Canada a group of research organizations charged with the mobilization of scientific men and laboratories for the study of military and industrial problems. The value of their contributions to military practice has been recognized by the French Minister of War and by Sir Douglas Haig in his reports from the front. The success of their efforts to relieve industrial distress resulting from the stoppage of exclusively German pro-

ducts has greatly enhanced the appreciation of scientific research by British and French manufacturers. Thus the scientific methods which lie at the basis of Germany's military and industrial strength have been effectively adopted by the Governments and peoples of the Entente.

In April, 1916, soon after the attack on the "Sussex" and our consequent demands for the cessation of submarine warfare had developed a critical situation with Germany, the President requested the National Academy of Sciences to organize the scientific resources of the United States in the interest of national security and welfare. The request of the President called for immediate and vigorous action. He expressed the desire that the Academy should coördinate the scientific resources of the entire country and secure the coöperation of all agencies, governmental, educational, and industrial, in which research facilities are available.

The National Research Council, comprising the chiefs of the technical bureaus of the Army and Navy, the heads of Government bureaus engaged in scientific research, a group of investigators representing educational institutions and research foundations, and another group including representatives of industrial and engineering research was accordingly constituted with the active coöperation

of the leading national scientific and engineering societies. The representatives of the Government were appointed by the President, who promised his cordial support and the coöperation of the Government departments. Subsequently, (February 28, 1917) the Council of National Defense adopted the following resolution:

> "Resolved, That the Council of National Defense, recognizing that the National Research Council, at the request of the President of the United States, has organized the scientific forces of the country in the interest of national defense and national welfare, requests that the National Research Council coöperate with it in matters pertaining to scientific research for national defense; and to this end the Council of National Defense suggests that the National Research Council appoint a committee of not more than three, at least one of whom shall be located in Washington, for the purpose of maintaining active relations with the Director of the Council of National Defense."

Since that time the National Research Council has acted as a department of the Council of National Defense, charged with the organization of scientific researches bearing on the national defense and on industries affected by the war.

WORK OF THE RESEARCH COUNCIL

In times of peace the work of the Research Council involves the promo-

tion of research in every department of pure and applied science. At present, however, the attention of the Council is concentrated on war problems, both military and industrial. Let us see how these are attacked.

The Military Committee consists of the Surgeon General of the Army, the Medical Director of the Navy, the Chiefs of Ordnance of the Army and Navy, the Chief Signal Officer of the Army, the Chief Naval Constructor, the Engineer in Chief of the Navy, and the Director of the Bureau of Mines, the Chief of the Weather Bureau, the Director of the Geological Survey, Mr. Howard Coffin of the Advisory Commission of the Council of National Defense, the Director of the Bureau of Standards (Secretary), and the Secretary of the Smithsonian Institution (Chairman). This committee formulates most of the military problems, designating in each case an officer in one of the technical bureaus of the Army or Navy who is familiar with the requirements and with whom the investigator engaged in the work may keep in touch. Dr. Robert A. Millikan, Vice Chairman of the Council charged with the correlation of researches bearing on the national defense, then organizes the investigation by enlisting the services of one or more men especially qualified by experience and laboratory equipment. If, as is usually advisable, several

research men attack the problem simultaneously, Dr. Millikan arranges for any desired coöperation between them. Freedom of initiative is encouraged, and any attempt at hampering control or interference with the freedom of action required for successful research is carefully avoided.

The above remarks relate more particularly to physical research, though Dr. Millikan's field of activity embraces a much wider range. Associated with him in Washington are Dr. Bogert, Chairman of the Chemistry Committee, and Dr. Vaughan, Chairman of the Committee on Medicine and Hygiene. These Chairmen, and those of the other committees of the Research Council, are constantly engaged in organizing researches in their respective fields, in coöperation with the Military Committee and with Dr. Millikan. In this way, a most helpful and inspiring association of our individual investigators, our universities, our industries, and the various branches of our Federal Government, is being brought about—a coöperation which is of the utmost value to any country and which is vital to it in time of war.

It may be of interest here to give some illustrations of the ways in which the various committees are contributing to the national defense.

Mathematics (Dr. E. H. Moore, Chairman) and

Astronomy (Dr. E. C. Pickering, Chairman)

Hydrodynamical investigations bearing on ship design and improvement of aircraft. Statistical studies and computations required in any field. Optical devices for lookouts, to facilitate the detection of the periscopes of submarines.

Physics (Dr. R. A. Millikan, Chairman)

Exhaustive study of devices for detecting completely submerged submarines and mines; range finders of various types; devices for detecting invisible aircraft and sapping parties; improvements in wireless apparatus and other instruments used with aircraft; military photography.

Chemistry (Dr. Marston T. Bogert, Chairman)

Generation, detection and absorption of hydrogen, and problems incidental thereto; absorption of other gases, particularly noxious ones; fire extinguishers; prevention of corrosion and electrolytic action on the hulls of vessels; non-corrosive metals and alloys for a great variety of uses; balloon fabrics; fabrics for army slickers; bacteriological and biological stains; synthetic drugs; special reagents for investigators; new explosives; new sources of important products; utilization of wastes and by-products.

Botany (Dr. J. M. Coulter, Chairman)

Organization of a botanical raw products clearing house, to aid manufacturers needing raw products of a botanical nature such as gums, oils, resins, fibres, wood, etc. to find either new geographical sources or new specific sources.

Geography, (Dr. W. M. Davis, Chairman)

Special maps for military purposes; instructions for the use of topographic maps; handbooks on military areas; physiographic features of the United States.

Geology (Dr. J. M. Clarke, Chairman)

Camp sites; finding of water supply; materials for road building; topographic structure of military areas; supply of necessary minerals.

Medicine and Hygiene (Dr. Victor C. Vaughan, Chairman) and

Physiology (Dr. Walter B. Cannon, Chairman)

Anti-toxins and serums for diphtheria, tetanus, pneumonia, dysentery and meningitis; intradermal method of vaccinating for smallpox; polyvalent vaccines for typhoid fever; sterilization of drinking water; toxicity of preserved foods; soldiers clothing and blankets; infected wounds; shock; fatigue; occupational diseases, with special reference to muni-

tion workers; protection of the ear from high explosives; instruction of Army and Navy surgeons in the Carrel method of antiseptic surgery.

Anthropology (Dr. W. H. Holmes, Chairman) and

Anatomy (Dr. H. H. Donaldson, Chairman)

Physical and hygienic requirements of recruits for the Army and Navy; language requirements; condition of teeth; abnormalities; minimum height and weight; standardization of measurements; data and materials for scientific research.

Psychology (Dr. Robert M. Yerkes, Chairman)

Organization of psychological tests for use in recruiting, to eliminate mental defectives and nervous types; selection of recruits especially adapted for aviation and other difficult tasks; study and treatment of returned soldiers, nervously or mentally affected; aid in re-education of partially incapacitated men; aid in deciding government liability and award of pensions.

Engineering (Mr. Gano Dunn, Chairman)

This committee, which will organize research in the various branches of engineering, has just been organized with

the coöperation of the national engineering societies.

In addition to the above general committees, the Research Council, has a number of special committees dealing with important problems.

Nitrate Supply (Dr. Arthur A. Noyes, Chairman)

This committee, which was appointed at the request of the Secretary of War to consider the process to be used by the Government in its plant for producing nitrates for explosives and fertilizers, has submitted a full report.

Food (Dr. Alonzo Taylor, Chairman)

This committee is working in coöperation with the Department of Agriculture and with Mr. Hoover's Food Committee.

An extensive investigation of the toxicity of preserved foods is also being conducted by Dr. Rosenau in consultation with an advisory committee named by the Research Council.

Optical Glass (Dr. Robert A. Millikan, Chairman)

Through the coöperation of the Bureau of Standards and the Geophysical Laboratory of the Carnegie Institution of Washington with glass manufacturers, the problem of supplying optical glass

for military purposes is well advanced toward solution.

Foreign Service Committee (Dr. Joseph S. Ames, Chairman)

The first step in any work of research is to learn what has already been accomplished in the same field. Great progress has been made abroad since the beginning of the war by the scientific investigators of the Allied countries. A committee has accordingly been sent to Europe to report from the front on scientific matters of every kind and to arrange for coöperation in the study of questions still underlying military and industrial problems. This committee includes two physicists, two chemists, one metallurgist, and two representatives of medicine and hygiene.

Committees of the Research Council not immediately engaged on national defense questions are those on the Promotion of Industrial Research (Dr. J. J. Carty, Chairman) and on Zoology (Dr. Edwin G. Conklin, Chairman). The members of the Agriculture Committee (Dr. Raymond Pearl, Chairman) are coöperating with the Department of Agriculture in the moblization and development of the agricultural resources of the country.

CENSUS OF RESEARCH

A national census of the research facilities of Government bureaus, educa-

tional institutions, research foundations, and industrial research laboratories is being taken by the Research Council. The forms from educational institutions, which are coming in rapidly, contain much valuable information bearing on the solution of defense problems. Forms for other institutions are now being sent out.

The Committee on Research in Educational Institutions has recommended the formation of Research Committees in universities, colleges, schools of technology, and other educational institutions where research is conducted. The Research Committees already established by a large number of institutions in response to this request serve as local organizations which work in coöperation with the Research Council.

COOPERATION WITH STATE COUNCILS OF DEFENSE

The organization of the National Research Council is based upon the principle of broad and effective coöperation between the numerous research agencies of the United States and those of the Allied countries. The Council is in reality a federation of research laboratories working together toward a common end. At present its chief purpose is to assist in winning the war, both by the perfection of military devices and by the solution of industrial problems which the war

has occasioned. But in the future, as already stated, it will devote its attention to the promotion of research in all branches of pure and applied science.

The organization of researches bearing on the national defense frequently involves the coöperative effort of many investigators residing in different states. Sometimes the joint action of an entire university laboratory, provided for through the assistance of the Research Council of the university in question, is essential to success. We have several researches in hand in which entire laboratories are taking part. More commonly, however, individual investigators known to be especially qualified are enlisted by the National Research Council from widely scattered institutions.

Such is the mode of procedure, necessarily followed in the study of national problems. Local questions are constantly arising, however, which can be best solved through the efforts of local investigators familiar with the particular industries or resources involved, acting in coöperation with a national body in touch with researches in progress at home and abroad.

We accordingly suggest that the representatives of science and engineering, or the Research Committees appointed by State Councils of Defense for the purpose of promoting through scientific investigations the industrial and agricul-

tural development of the several States, arrange for close coöperation with the National Research Council. In this way the research activities of the States may be coördinated with one another, and with those of the national Government; and the information secured by the National Research Council and by the separate State organizations may be rendered available for all.

Communications regarding the Research Council may be addressed to the Chairman at the Munsey Building, Washington, D. C.

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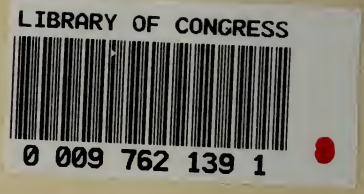
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